

Strategic Technologies for Autonomy & Resilience Tools (START), Phase I

Completed Technology Project (2018 - 2019)



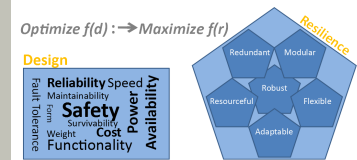
Project Introduction

Singularity - Intelligence Amplified, LLC proposes to develop a resilience toolkit enabling the planning, assessment, implementation, and utilization of resilience for future manned spaceflight and autonomous systems. The Strategic Technologies for Autonomy & Resilience Tools (START) project will demonstrate the associated technologies the company envisions integrating as a toolkit within a modular framework for designing and enabling resilience for autonomous systems. The team proposes to use an incremental and modular development approach, permitting capture, modeling, and assessment of uncertainty throughout the process. A spiral development approach, beginning with architecture design and proposed approach feasibility will permit maximal reuse of incremental toolkit development artifacts. Accompanying the toolkit will be a set of defined metrics for resilience which enable the quantification of success, including improvement over baseline and enabling the computational optimization of contingency configurations. The end product, accompanied with a Bayesian inspired overlay for uncertainty management offers a novel concept enabling design for resilience and risk assessment in the face of possibly unforeseen and previously not encountered situation. Resilience leverages thoughtful design, intimate knowledge of inherent component properties, and system capabilities. Operational resilience incorporates understanding of mission goals and condition awareness, along with anticipation enabled through possibility modeling and simulation within an aware, intelligent framework to yield a best fit solution in dynamic situations. While maximizing on a central goal, the system will track and prioritize the optimal solution across multiple facets of sustainability, future outcomes, and mission success. Prior relevant work in autonomy, robustness assessment, systems reliability, health management, and agent-based systems will inform the research and development effort.

Anticipated Benefits

Automated contingency management for space exploration and advanced systems health management for electrical power represent the key areas to be demonstrated during the proposed Phase I & Phase II projects. Other applicable areas include manned and unmanned flight systems, air traffic control systems, and propulsion health management systems.

Autonomous Vehicles; Self driving cars; Mass transportation systems; Electrical Power Grid; Alternative Energy Systems.



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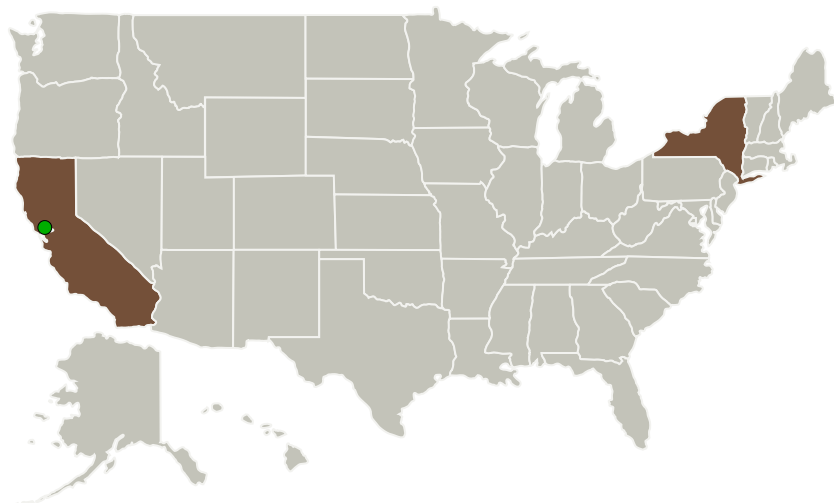
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Singularity - Intelligence Amplified, LLC	Lead Organization	Industry	Conesus, New York
● Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations

California	New York
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Project Transitions

July 2018: Project Start

February 2019: Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/137315>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Singularity - Intelligence Amplified, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

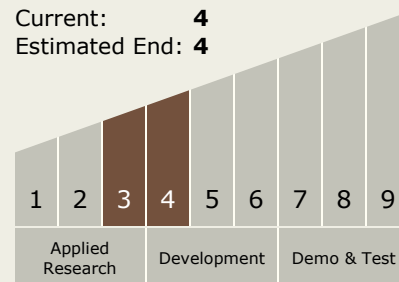
Program Manager:

Carlos Torrez

Principal Investigator:

Patrick W Kalgren

Technology Maturity (TRL)

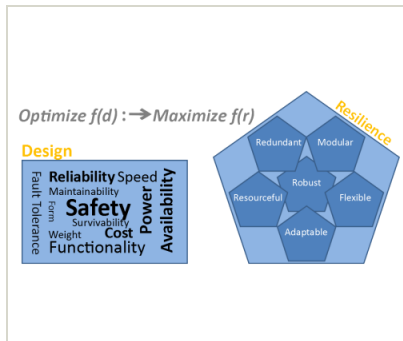
Start: **3**Current: **4**Estimated End: **4**

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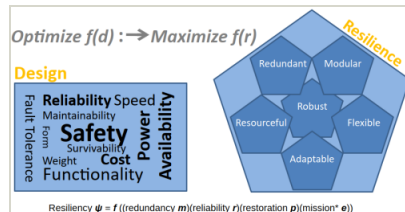
Images



Briefing Chart Image

Strategic Technologies for Autonomy & Resilience Tools (START), Phase I

(<https://techport.nasa.gov/image/137085>)



Final Summary Chart Image

Strategic Technologies for Autonomy & Resilience Tools (START), Phase I

(<https://techport.nasa.gov/image/126427>)

Technology Areas

Primary:

- TX10 Autonomous Systems
 - └ TX10.2 Reasoning and Acting
 - └ TX10.2.2 Activity and Resource Planning and Scheduling

Target Destinations

Earth, The Moon, Mars